



*Concurrent  
Technologies  
Corporation*

## **Developing Emission Factors for Shipyard Welding Operations**



Environmental Technologies SP-1 Panel  
New Orleans, LA  
February 19, 2009





# Panel Project Team

- **Supporting Organizations**
  - National Shipbuilding Research Program (NSRP)
  - Advance Technology Institute (ATI)
  - Naval Sea Systems Command (NAVSEA)
  - Naval Surface Warfare Center Carderock Division (NSWCCD)
  - Shipbuilders Council of America (SCA)
  - American Shipbuilding Association (ASA)
- **Navy Shipyards**
  - Norfolk Naval Shipyard (NNSY)
  - Puget Sound Navy Shipyard (PSNS)
- **Commercial Shipyards**
  - Atlantic Marine Jacksonville
  - BAE Systems San Diego – *Program Technical Representative (PTR)*
  - BAE Systems Norfolk Ship Repair
  - Bath Iron Works (BIW)
  - Bollinger Shipyards
  - General Dynamics Electric Boat (EB)
  - General Dynamics (GD) National Steel and Shipbuilding Company (NASSCO)
  - Northrop Grumman Newport News (NGNN)
  - Northrop Grumman Ship Systems (NGSS)
- **Primary Contractor and Subcontractors/Consultants**
  - Concurrent Technologies Corporation (*CTC*)
  - Applied Research Laboratory (ARL) - Penn State Univ.
  - SofTek Systems Inc. (SSI)
  - Analytical Laboratory (TBD)



# Background

The previous NSRP Residual Risk Ruling (RRR) project demonstrated that:

- Current data used for rulemaking decisions contained inaccuracies and gaps
  - The RRR effort concentrated on the inaccuracies associated with modeling inputs (stack height, location)
  - **BUT** the uncertainty in the current emission factors remained
- Data gaps and inaccuracies increase the calculated risk that the industry presents to public health
  - Modeling efforts demonstrated a reduction in risk when actual facility specific shipyard data replaced data developed by the U.S. EPA.
  - **What effect do the current emission factors developed by the U.S. EPA have on the calculated risk to public health?**



# Industry Need

- A significant result of the previous NSRP RRR project was the identification of industry need for high quality emission factors for common welding operations
- This result was based on the following:
  - Limitations and data gaps were discovered in the current AP-42 data set
  - Current emission factors were being developed statistically using data from multiple studies in which sampling methods varied
  - Lack of data was forcing the U.S. EPA to use conservative assumptions in regulatory decisions
  - Data collected during the NSRP RRR project demonstrated lower emissions than current AP-42 and proposed RRR emission factors
  - U.S. EPA expressed interest in obtaining data to update the existing AP-42 emission factor data set.

**With the upcoming release of the RRR, it is critical that shipyard emissions be reported accurately to avoid unnecessary fines for non-compliance.**



# Response to Industry Need

- Phase II of the NSRP RRR project was not awarded due to the delay in the release of the new ruling.
- The industries need for high quality emission factors remained
- *CTC* developed and submitted a white paper to respond to this need by developing high quality emission factors for the industry
  - *CTC* received support in developing the white paper from various members of the past RRR project team.
  - The team that submitted the white paper included:
    - BAE Systems Norfolk Ship Repair – shipyard project support and cost share contributor
    - Bath Iron Works – shipyard project support
    - Penn State University (PSU) Applied Research Laboratory (ARL) – technical support
    - Softek Systems, Inc. – emission factor Subject Matter Expert oversight
- The panel project was awarded by ATI on January 1, 2009.



# Project Objectives

- Identify welding electrodes that are commonly used within the industry and determine those that currently lack high quality emission factors.
- Review the identified electrodes to determine their potential to emit Hexavalent Chromium and/or Manganese which are the primary constituents driving shipyard offsite public health risks.
- Develop high quality emission factors for the selected electrodes that will be accepted by the U.S. EPA for use in regulatory calculating and reporting procedures..



# Project Approach

## Task 1 – Identify Electrodes for Evaluation

- Develop a survey instrument to inform shipyards of the project, and request information on electrodes that they would like to see evaluated under this project
  - Conducted a pilot test to obtain feedback from project team members in an attempt to increase response rate
  - Survey will be distributed to the shipyards *CTC* contacted as part of the RRR project
- Research published emission factor data to determine if emission factors exist for the selected electrodes, and determine the level of quality associated with the emission factors
- Develop a prioritized list of up to 10 electrodes. Priority will be based on
  - The number of individual shipyard requests for the electrode
  - The lack of a high quality emission factors
  - Its potential to drive shipyard offsite public health risks
- The final selection and number of electrodes will be presented to shipyards for review and acceptance
- A final electrode summary and selection report will be prepared.



# Project Approach

## Task 2 – Collect and Analyze Weld Fume Samples

- Develop a Sampling and Analysis Plan that will be used to collect and analyze welding fumes
  - The final SAP will be presented to shipyards for feedback and final acceptance
  - It will then be submitted to the U.S. EPA for review and acceptance
- Conduct weld fume sampling and use the resulting data to develop emission factors





# Project Approach

## Task 3 – Develop Emission Factors for Evaluated Electrodes

- Utilize data collected during Task 2 to:
  - Validate and expand on the emission factors developed during the previous project to provide additional confidence in their results
  - Expand on the types of electrodes evaluated to be more representative of the entire industry.
- Prepare a Final Project Technical Report
  - Objectives of the project
  - Results and emission factors developed
  - Benefits (quantitative and qualitative),
  - Conclusions/recommendations or lessons learned.
- Provide the report to the NSRP for submittal to the U.S. EPA



# Project Accomplishments to Date

- Developed a draft survey instrument
  - Distributed it to the team prior to the kickoff meeting for review
- Conducted project kick off meeting on January 23
  - Received the following feedback:
    - Recommendation to allow survey participants to recommend base metals types
    - Incorporate Lead into the metals analysis
    - Expressed interest in obtaining PM data (depending on project constraints)
    - Determine if there is a correlation between electrode composition and emission factors
- Received final acceptance on the survey instrument from the project team on February 11



# Path Forward

- Finalize the survey and distribute it to shipyards for completion
  - Submission to shipyards – February 25
  - Receive completed surveys – March 13
- Prioritize identified electrodes and make final selection
- Complete the Electrode Usage Summary and Selection Report.
  - Draft report – March 27
  - Final - April 30
- Develop the Sampling and Analysis Plan (SAP).
  - Draft SAP - April 10
  - Submission to the U.S. EPA – April 30
  - Final SAP – June 8
- Complete testing in June.
- Complete Final Project Technical Report
  - Draft report – August 10
  - Final report – August 28



# Project Schedule

MILESTONE	TARGET DATE
<b>Survey</b>	
Draft survey to project team for review & comment	1/21/09
Receipt of Comments	2/6/09
Survey Distribution to 86 shipyards	2/20/09
Receipt of Comments	3/13/09
<b>Electrode Usage Summary and Selection Report</b>	
Draft report to project team for review & comment	3/27/09
Final report to ATI	4/30/09
<b>Sampling and Analysis Plan (SAP)</b>	
Draft SAP to project team for review & comment	4/10/09
Draft SAP to U.S. EPA for review and comment	4/30/09
Final SAP to ATI	6/8/09
<b>Collect and Analyze Weld Fume Samples from the Selected Electrodes</b>	
Sampling Testing	6/8/09 - 6/10/09
Analysis	6/12/09 - 7/10/09
<b>Final Project Technical Report (that includes emission factors developed)</b>	
Draft Final Report to project team for review & comment	8/10/09
Receipt of Comments	8/24/09
Final Report to ATI	8/28/09





## Contact Information

### **Project Manager**

Ms. Tiffany Belz, *CTC*  
belzt@ctc.com  
(703)310-5686

### **Technical Lead**

Mr. Joe Jackens, *CTC*  
jackensj@ctc.com  
(814)269-2589

### **PTR**

Mr. Shaun Halvax, BAE Systems San Diego  
[Sandor.halvax@baesystems.com](mailto:Sandor.halvax@baesystems.com)  
(619) 238-1000

### **ATI**

Mr. Justin Montague  
[justin.montague@aticorp.org](mailto:justin.montague@aticorp.org)  
(843) 760-3339

Mr. Jim House  
[house@aticorp.org](mailto:house@aticorp.org)